How AI localisation in plant tissues determines the targeted pest spectrum of different chemistries

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ABSTRACT

How AI localisation in plant tissues determines the targeted pest spectrum of different chemistries

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Many pests suck on the vascular system and/or cells of different plant tissues. The sucking target in the cell differs between pests such as Hemiptera (e.g. aphids and whiteflies) or Acari (mites). The agronomic control of sucking pests is most effective with pesticides taken up orally. The cuticle penetration as first crucial step can be modified by formulation whereas the active ingredient (AI) distribution within cells is usually solely determined by physicochemical properties. This passive AI distribution was calculated with the Fick-Nernst-Planck equation implemented in a cell model. The predictions were compared to the measured biological effects against three different arthropods. Test compounds differed in log P (-0.1 to 4.3) and pKa (4.1 to 10.7). Efficacies in different bioassays are discussed with the postulated cellular AI localisation and the individual feeding behaviour of the targeted pest.

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